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The Antiseptic Treatment of
Summer Diarrhoea.

BY

L. EMMETT HOLT, A. M., M. D.,

ATTENDING PHYSICIAN TO THE NEW YORK
INFANT ASYLUM.

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THE ANTISEPTIC TREATMENT OF SUMMER DIARRHŒA.*

BY L. EMMETT HOLT, A. M., M. D.,
ATTENDING PHYSICIAN TO THE NEW YORK INFANT ASYLUM.

I HAVE chosen the title summer diarrhoea for this paper, as it indicates with sufficient exactness the clinical symptoms that we all understand, while not committing us to any one of the theories advanced regarding their pathology. As my purpose is to consider a method of treatment, I shall only incidentally discuss the subjects of ætiology and pathology, as these bear directly upon the therapeutics of the disease.

Lest any one may misunderstand me, I wish to state at the outset, and with emphasis, that I do not ignore nor undervalue other methods of treatment than the use of drugs. The question that I propose is, What is the best treatment for that vast number that crowd our dispensaries and other institutions, summer after summer, for whom no change of air is possible, and only limited and imperfect dietetic regulations are practicable?

One conclusion has been long forcing itself upon my mind with increasing strength every summer—viz., that, excepting the comparatively rare cases of pure cholera infant-

* Read before the New York Academy of Medicine, January 29, 1887.

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tum, nearly all the diarrhoeas and intestinal catarrhs of young children are essentially dyspeptic in their origin.

I have been pleased, within the last few days, to find virtually the same statement from the pen of so high an authority as Henoch, of Berlin. All the well-recognized factors in the causation of summer diarrhoea—excessive heat, artificial or improper feeding, and bad hygienic surroundings—unite in this, that they prevent the food in the child's stomach from being digested, in consequence of which it undergoes fermentative or putrefactive changes. It is a combination of the three factors rather than any one alone which produces the resulting dyspepsia.

If it were heat alone, we should expect the greatest frequency of the disease to be at the most tender age—under six months. Such is not the case. Of four hundred and thirty-one patients of my own, only 12·8 per cent. were under six months, while 59·5 per cent. of the cases occurred between the ages of six months and two years. The explanation is obvious. Under six months the great majority of the children of the poorer classes receive breast-milk either exclusively or principally, while from that time on they are accustomed to be fed from the table, or on articles totally unfitted for infantile digestion. It is a striking fact that Hope,* of Liverpool, brings out, in his statistics of five hundred and ninety-one fatal cases of summer diarrhoea in children under two years of age, that only twenty-eight had the breast exclusively; while Ballard † states that of three hundred and forty-one fatal cases occurring in Leicester, only 2 per cent. of the children had had no food but the breast. These statistics show that we are to attribute to the feeding quite as much as to the heat, if not the occurrence of the diarrhoea, at least its fatality.

* "Liverpool Medico-chirurgical Journal," July, 1885.

† "Brit. Med. Journal," 1883, ii, 363.

Heat is a causative factor in many ways. It impairs the child's power of digestion by depression of his nervous energy. It causes thirst from free perspiration and leads the child to take more food than the stomach can take care of, even though it be pure breast-milk. It increases all decomposition in the streets, in the sewers, and in filthy tenements, and these children breathe an atmosphere charged with the products and germs of decomposition. But more important than all else, perhaps, are the changes it causes in the food itself before it is taken into the body. Most of the articles of food are of such a nature that these changes readily take place, even in a few hours, in August weather.

An instance of how quickly diarrhœa is caused by tainted milk came under personal observation not long since, where every one of twenty-three healthy children occupying a ward was taken in a single day with diarrhœa after eating milk which subsequent examination showed to be unfit for consumption.

When we consider the manner in which food is prepared for these children in tenement-houses, the want of cleanliness in utensils and in hands, how it is often left standing for hours in open vessels at the temperature of the room, the wonder is only that so few suffer from diarrhoeal diseases during the hot term..

This brings us to the subject of the poisons produced from food, or ptomaines, and their effects. The investigations of Brieger and others upon this subject have let in a flood of light, it seems to me, upon the pathology of some of these cases of diarrhœa.

In the investigation of the well-known Michigan cases of ice-cream poisoning recently, Professor Vaughan has reached the conclusion that the symptoms, prominent among which were the vomiting and purging, were due to

an alkaloid developed from the milk, to which he has given the name tyrotoxicon.

Brunton states * that most of the alkaloids which have been obtained from the decomposition of albumin tend to produce diarrhoea.

This knowledge of poisons developed from food is of only recent date—too recent for us yet to say to what degree we may be compelled to reconstruct our pathology of many diseases connected with the organs of digestion. But enough has been already established to lead us to hope that along this line of investigation we may find a solution to many hitherto insoluble problems.

A strong popular prejudice has long existed that there is great danger of the supervention of cerebral symptoms if diarrhoeal discharges are abruptly checked. It is also well known that in severe and protracted cases a cessation of the diarrhoea often occurs for a few days before death, coincident with the development of symptoms commonly denominated hydrencephaloid. And now Bouchard tells us, as the result of his investigations upon ptomaines produced within the body, that "the poisonous activity of human faeces is very great even when they are quite healthy. A substance obtained from them by dialysis caused violent convulsions in rabbits. Enough alkaloids are produced in the intestines of a healthy man in twenty-four hours to kill him, provided they were all absorbed and excretion stopped. There seems to be little doubt that the amount of ptomaines produced in disease is greater than in health." †

Aside from the toxic effects which, it seems very probable, are produced by food-poisons, we have the local effects of undigested food in the stomach and intestines,

* "Disorders of Digestion," chapter "Food and Poisons," p. 291.

† Brunton, *op. cit.*, p. 290.

and these it is which produce the catarrhal changes. The great proportion of these cases begin with vomiting and diarrhoea, the vomiting ceasing usually after the first day or two. The first stools are those of a dyspeptic character, and it is generally not until several days have elapsed that we find proof in the passages of catarrhal inflammation in the bowel.

I need not cite statistics, as it is the all but universal testimony that inflammatory changes are mainly in the colon; it is uncommon to find any changes in the small intestine further than a swelling and redness of Peyer's patches, and slight congestion of the lower part of the ileum.

In the colon itself the most marked lesions are found in the caecum and sigmoid flexure, just where the irritating substances are longest detained in their movement onward. The colitis, then, I think, is to be looked upon, in most cases at least, as secondary and consecutive, depending upon how long the morbid process has been suffered to go on before it is checked.

Regarding a special microbe as a cause of summer diarrhoea, we lack as yet sufficient evidence of its existence. Immense numbers of bacteria of many varieties are found in the discharges. Baginsky * asserts that often the small white lumps seen in the passages and called curds are made up of nothing but masses of bacteria. This same investigator has isolated one bacillus which, he thinks, is peculiar to cholera infantum; but, as Clado and Damaschino have settled upon a different one, and as experiments with pure cultivations from neither have yet been made, we must consider the subject as still *sub judice*.

We are now prepared to consider the different indica-

* "Verdauungskrankheiten der Kinder," 1884.

tions for treatment. These may be grouped under four heads :

1. To clear out the bowels.
2. To stop decomposition.
3. To restore healthy action in the intestine.
4. To treat the consecutive lesions.

The bowels should be emptied as completely as possible, as the first step in the treatment, and for precisely the same reasons that the surgeon cleanses a wound thoroughly before applying his antiseptic dressing. It is a rule laid down in all text-books that if an antecedent constipation has existed, or if there is evidence that indigestible food has been swallowed, it is the proper thing to begin with a cathartic.

I wish to go a little further than this, and say that in all cases, whether such a history is obtained or not, it is a good rule to follow. If not decomposing and irritating food, we have almost always altered secretions undergoing the same putrefactive changes.

If the stomach is not very irritable, nothing, to my mind, compares in efficiency with castor-oil. If there is severe vomiting, a copious injection of pure water at a temperature of about 65° F. may be used. To be efficient, this must be large enough to reach the ileo-cæcal valve. This, by experiment on the cadaver, I have found to be about one pint in a child six months, and about two pints in one two years old. It should, of course, be given slowly, with a fountain syringe, the abdomen meanwhile being gently manipulated.

I have had abundant proof, in the cases occurring among the children at the Infant Asylum, that a great many of the mild cases, if taken promptly at the start, can be cured by the castor-oil alone, provided suitable regulation of the diet after it can be enforced. In severer cases, and especially those in dispensary practice, it produces temporary improvement

only. The value of oil in these cases is well understood by the laity—better, I sometimes think, than by many in the profession. I kept a record for a time, and found that about one fourth of all the patients brought to the dispensary for treatment had been previously given the oil at home, usually at the outset. The almost invariable testimony was that on the day or two following decided improvement occurred; by the third day, however, they were usually as sick as ever.

There is obviously no need either of cathartics or of irrigation of the bowel in cases where, after two or three faecal or semi-faecal movements, the discharges consist of almost pure serum, large in amount, alkaline in reaction, and odorless.

To meet the second and third indications—*i. e.*, stop decomposition and restore a healthy action in the intestine—two things are requisite: the administration of an antiseptic, and attention to the diet.

The antiseptic must be given in small doses and frequently—in small doses, lest the stomach reject it; and frequently, as it is a continuous effect that we desire. It must be of such a nature and in such a form as to be easily administered. A nauseous prescription, no matter how excellent its ingredients, should never be given, and need never be. I have seen many cases where, I am sure, the medicine given was the chief factor in keeping up the gastric disturbance. It must be one, if possible, which has the effect of restoring the tone of the alimentary tract. After experimentation with various drugs, my own preference is in favor of the salicylate of sodium. The details will be given in a subsequent part of the paper.

If there is much vomiting, no food whatever should be given for from twelve to twenty-four hours. Thirst can be satisfied by giving either carbonic-acid water or thin barley

gruel, cold, and a teaspoonful at a time. If the child is at the breast, as soon as vomiting is controlled it can gradually be brought back to its accustomed diet, great care being used that too much food is not given.

In children under two years not fed at the breast it is better to *withhold milk entirely*. This has been a subject of careful investigation during the past summer at the New York Infant Asylum, and both the resident physicians and myself have had this proved to our satisfaction by a large number of cases. Peptonized milk is very much less likely to disagree than either condensed milk or fresh cow's milk. But in many even this caused an aggravation in the intestinal symptoms, particularly in severe and protracted cases. Again and again have I seen relapses brought on when milk was added to the diet in cases where the stools had been practically normal for two or three days.

Our "no-milk diet," as it came to be known, comprised the following articles: Wine whey, chicken and mutton broths, Mellin's food with barley gruel, expressed juice from rare beefsteak or roast beef, and in a few cases raw scraped beef. With this variety we usually had no difficulty in dispensing with milk.

The fourth indication, or the treatment of consecutive lesions, is not so easily met. As hinted above, the essential changes are in the colon, and consist practically of little else than a follicular colitis.

When the condition of ulceration is reached, I believe the use of astringents by the mouth to be absolutely useless. Cases treated by such means I have nearly always found to run on until cool weather came. What, in fact, ought we to expect from fraction-of-a-grain doses of nitrate of silver or acetate of lead when we remember that their action is needed upon the last four feet of the bowel? Bismuth in large doses seems more plausible, but practically

it has failed with me five times where it has succeeded once.

I have settled upon three things as valuable :

First, as careful attention to the diet as during the acute stages, and in recent cases. Deviation from dietetic rules has been the most frequent cause of relapses.

Secondly, the continuance of the use of the antiseptic as the only sure means of checking intestinal decomposition, and hence stopping the irritation.

Thirdly, the whole large intestine should be washed out once every day, either with pure water at a temperature of about 65° F., or with a weak antiseptic solution, or with an astringent solution. Of the former the best are probably benzoate and salicylate of sodium ; of the latter, the nitrate of silver and tannic acid.

Before taking up the use of antiseptics historically, I wish to call attention to this fact : that, except opium, with regard to the value of which in summer diarrhœa there has always been much controversy, almost all the drugs that have held their place for the last twenty-five or fifty years are now universally recognized as antiseptics—some of them very powerful ones. Prominent among these I may mention bismuth, calomel, the mineral acids, especially sulphuric, the chloride and sulphate of iron, and the nitrate of silver. It seems to me altogether probable that the value of these drugs, for value they certainly possess, depends not upon their astringent action, as we have so long been taught, but upon their effect as antiseptics.

The earliest treatment of diarrhœal diseases by pure antiseptics of which I have been able to find record was by Mayes * in 1846 ; the drug he used was *creasote*. He states that it should be preceded by a cathartic, since diarrhœal diseases are oftenest caused by undigested food in the in-

* "Southern Med. and Surg. Journal," 1846, ii, 583.

testine in a state of decomposition. In his second publication* he confirms his earlier impressions.

In 1847 an article on the value of creasote was published by Beirão.†

In 1849, Spinks,‡ after using creasote extensively, published some statistics of two hundred and twenty-four cases of simple diarrhoea. Ninety-three were treated by opium, chalk, etc., in all of which the disease lasted several days, and was followed by flatulence. One hundred and thirty-one cases were treated by creasote alone, "in all of which the diarrhoea immediately ceased." This drug he used in twelve cases of "rice-water purging," with equally good results.

In 1851, Kestevan,* influenced by the writer just mentioned, published his results of the use of creasote in over one hundred cases of diarrhoea and dysentery; in no single case did improvement fail to occur. He thought it more efficient than any other drug in stopping the vomiting, purging, and pain.

Woodson † the next year still further confirmed Kestevan's experience, after the use of creasote in twenty cases in children and in adults. Its action was prompt and invariably successful. He places it far above opiates.

Further testimony to the value of creasote was borne by J. G. and W. F. Westmoreland,‡ who had seen cases of malignant army dysentery cured by it in large doses, and others of a protracted character which had resisted for months all the ordinary methods used.

Davis,◊ in 1872, spoke in high terms of the value of

* "Southern Med. and Surg. Journal," 1847, iii, 151.

† "Jour. Soc. de Sci. Med.," Lisbon, 1847.

‡ London "Med. Gazette," 1849, 254. * *Ibid.*, 1851, 235.

|| "Western Jour. of Med. and Surg.," Louisville, ix, 1852, p. 289.

△ "Atlanta Med. and Surg. Jour.," vii, 1866-'67, p. 249.

◊ "Boston Med. and Surg. Jour.," Jan. 4, 1872.

carbolic acid in diarrhoeal cases, but, with this exception, for the last twenty years the drug is scarcely mentioned in current literature, and then usually only as a means of controlling vomiting.

Oil of Naphtha was used as early as 1849 by Lavisotte,* whose published experience, although embracing reports of ten cases only, was still enough to show that some very obstinate cases of diarrhoea, which had resisted for months the usual treatment of opium and astringents, could be cured by naphtha alone in a few days.

Two years later, Mavel † contributed to the same subject reports of four chronic cases of diarrhoea promptly relieved by naphtha.

Salicin was first recommended in diarrhoeal diseases, so far as I have been able to learn, by Mattison, in 1873.‡ He alleged for it, after considerable use, great superiority over opium and astringents in the treatment of cases of protracted diarrhoea, both in children and in adults.

During the next three or four years numerous articles appeared in the Southern medical journals, by Tucker,* Bishop,|| T. C. Smith,△ Hughson,◊ Tidd,† and others, confirming the statements made as to the great value of salicin. Many of the gentlemen referred to had used it extensively, but all were inclined to regard its mode of action as tonic or specific. In 1877 Mattison published ‡ a second article, collecting quite a large number of cases,

* "Gazette des hôpitaux, 1849, i, p. 46.

† *Ibid.*, 1851, i, 565.

‡ "Southern Med. Record," 1873, p. 671.

* *Ibid.*, 1873, p. 590.

|| *Ibid.*, 1874, p. 585.

△ *Ibid.*, 1875, p. 328.

◊ "Charleston Med. Jour.," ii, 1875, p. 297.

† "Detroit Rev. of Med. and Pharmac.," xi, 1876, p. 7.

‡ "Proceedings of the Med. Soc. of the Co. of Kings," i, 1877, p.

the experience of all who had used salicin being that, especially in protracted cases, it was the most valuable drug we possessed.

I have found but scanty reference to this treatment since that date, except by S. W. Smith,* in 1884, who states that, as early as 1858, the value of willow charcoal was made known to him by some sea-captain upon the Mediterranean, and that since that time he had regarded salicin as "a sheet-anchor in diarrhoeal cases." He calls special attention to its antiseptic properties, which, he states, exceed those of carbolic acid.

Salicylic Acid and its Salts.—The acid was first applied to the treatment of intestinal diseases by Stephanides,† who reported in 1875 two cases of obstinate dysentery promptly relieved by this drug. The acid was further employed in the same disease by Abelin in 1877.‡

In 1879, Kilner# published the results of some extensive experiments with the salicylates of bismuth and calcium. He speaks of them in the highest terms in cases depending upon summer heat, also those in autumn from sudden changes in temperature, and in all cases where indigestion and disturbance of the stomach are present.

In 1880, Hutchins,|| of Brooklyn, reported twenty-seven cases of severe serous diarrhoea in young children. He was led to use the drug from reading the article just referred to, and abundantly confirmed the statements made regarding salicylate of calcium, which he had employed. He used the single drug only, and in every case its administration was almost immediately followed by a cessation of the serous discharges. Slight catarrhal diarrhoea continued

* "Brit. Med. Jour.," ii, 1884, p. 711.

† "Wien. med. Presse," xvi, 1875, p. 297.

‡ "Allg. med. Central-Zeitung," 1877, Nos. 37, 38.

* "St. Thomas's Hosp. Reports," ix, 1879, p. 21.

|| "Proceedings of the Med. Soc. of the Co. of Kings," 1880, p. 223.

in some cases for a few days, but in none was there any recurrence of the watery stools. Segur, of Brooklyn, has used the salicylates in the treatment of the diarrhoea of phthisis, and both he and Hutchins speak in very high terms of its value here. In a recent personal communication to me, Dr. Hutchins states that subsequent experience has not changed his opinion regarding the great value of the salicylates, particularly in diarrhoeas with serous discharges tending to cholera infantum.

In 1881, Calleja * published an article on the value of salicylate of sodium in diarrhoeal diseases.

In 1885 Northridge † published eight cases treated by the salicylate of calcium. This writer believes firmly that it is to its antiseptic properties that the success of the salicylic-acid treatment is due.

During the present year Shank ‡ has written upon the value of the salicylate of sodium in the treatment of diarrhoeal disease in children, but he gives us no particulars regarding the cases in which it was used.

Braithwaite # has spoken of the great value of the salicylate of iron in many diarrhoeal affections, especially where the stools were offensive.

Naphthalin was introduced as an antiseptic in intestinal diseases by Rossbach || in 1884. The advantages stated for it were that it was a powerful antiseptic, that it was not toxic, and that, as it was insoluble both in alkalies and in acids, we could be sure of its local action. He found it of great value in old intestinal catarrhs of adults, and used it in twenty-four cases in children with the most gratifying results.

* "Rev. de med. y Cir.," Madrid, 1881, 97, p. 145.

† "New York Med. Jour.," Aug. 29, 1885.

‡ "Archives of Pædiatrics," July, 1886.

"Brit. Med. Journal," July 17, 1886.

|| "Berlin. klin. Wochenschrift," Nos. 42 and 46, 1884.

The same year Cognali* published six cases in which naphthalin was used with negative results; all were chronic, and all in adults.

In 1885, good results were published by Pauli† and Pribram ‡ from the use of naphthalin in the diarrhoea of children. Falkenberg # used it in numerous cases of dysentery with uniformly good results. This writer quotes from Karelín, who stated that the naphthalin treatment had "done wonders" in dysentery in the army, and also from Kusmin, whose experience in the Foundling Asylum at Moscow confirmed the good reports already given.

During the present year naphtthalin has been recommended by Bouchard || in combination with iodoform and charcoal.

Bichloride of Mercury.—This has in several editions of Ringer's "Therapeutics" been recommended in dysentery. Communications regarding its use, both in diarrhoea and dysentery, have been published by Ravenberg △ in 1878, Reed ♀ in 1879, Shultz † in 1880, and Millard ♦ and Morton ♪ during the present year. With one exception, particulars regarding the kind and number of cases treated, and exact results, have been omitted.

Shultz states that he has treated one hundred and twelve cases of severe dysentery with this drug, with only one fatal

* "Gazz. med. ital. Lombard," Milan, vi, 1884, p. 465.

† "Berlin. klin. Wochenschrift," xxii, 1885, p. 153.

‡ "Wien. med. Wochenschrift," xxxv, 1885, p. 242.

"London Med. Record," Dec., 1885, from "Voënn-Sanitaroë," 1885, No. 45.

|| "Revue de therapie," May 15, 1886.

△ "Med. Record," xiv, 1878, p. 4.

◊ "Philadelphia Med. Times," 1879-'80, p. 207.

† "Louisville Med. Herald," ii, 1880-'81, p. 341.

♦ "Brit. Med. Journal," July 31, 1886.

♣ "Med. Record," Sept. 18, 1886.

result. He thinks it deserves the title almost of a specific in severe cases of dysentery. In mild cases, opium and calomel might succeed, but in severe ones seldom.

During the past year or two several other drugs have been proposed, following out the idea of antiseptic treatment. Resorein has been advocated by Baginsky* and Faludi,† chloride of potassium by Moncorvo, bisulphide of carbon by Dujardin-Beaumetz,‡ and benzoate of sodium by Guaita.‡ Each writer alleges good results with his peculiar mode of treatment.

It would seem that enough facts have been given to the profession to establish the point that a great many other drugs besides opium, bismuth, chalk, and castor-oil possess real value in the treatment of diarrhœal diseases. Yet it is marvelous to see how wedded we have become to these old methods. In looking over a dozen of the most recent text-books on diseases of children, I find the treatment of summer diarrhœa described in almost the same words as those used by Eberle, Condie, and Dewees nearly half a century ago.

In the preparation of this paper I have endeavored to ascertain what drugs were most used in public practice in this city. In response to a circular letter sent out I have received information regarding the treatment of summer diarrhœa at the following institutions: Nursery and Child's Hospital, Foundling Asylum, Infant Asylum, Infants' and Children's Hospitals on Randall's Island, St. Mary's Hospital for Children, Infirmary for Women and Children, Demilt, New York, Northern, Northwestern, Eastern Dispens-

* *Op. cit.*

† "Pest. med.-chirurg. Presse," Buda-Pesth, xviii, 1882, p. 806.

‡ "Therapeutic Gazette," 1885, No. 3.

‡ "Archives of Paediatrics," 1884, p. 380, from "Gazz. degli ospitali," 1884, 26.

saries, Polyclinic, and the Out-door Department of Bellevue and that of Roosevelt Hospital. I wish here to thank the gentlemen who have been kind enough to furnish me with the particulars sought. The reports of these institutions show that upward of forty thousand children come under treatment annually. Roughly estimating from my own hospital and dispensary experience, I should say that at least twenty-five thousand of these come for diarrhoeal diseases.

These twenty-five thousand cases are treated as follows:

Bismuth is used largely in every one of the fourteen institutions.

Opium in some form is used everywhere; Dover's powder and paregoric generally. Opium is an ingredient in nearly every compound prescription given. Many physicians have testified that they relied almost entirely upon bismuth and opium.

Castor-oil as a preliminary step was much used in six institutions, followed usually by bismuth and Dover's powder.

Castor-oil emulsion, with opium, containing from three to ten drops of the oil and about the same quantity of paregoric to the dose, was extensively used at three places.

Chalk-mixture, usually combined with paregoric and some vegetable astringent, is a standard prescription in almost every dispensary, and is largely used.

Calomel, in small doses, is much used at three places.

Rhubarb and soda are largely used in four places, usually in conjunction with opium.

Ipecac is used at two places, aconite at one, pepsin largely at one, sulphuric acid and sulphate of magnesium mixture at one, benzoate of sodium at one, iodoform with opium and pepsin at one, coto bark at one, astringent injections, usually of nitrate of silver, in three places.

One physician begins his treatment with oil to clear out

the bowels. Beyond this point he has come to the conclusion "that all drugs are useless, particularly opium." His reliance after clearing the bowels is upon careful feeding.

Morphine and atropine hypodermically had given good results in some bad cases of cholera infantum in one hospital, though it was admitted that in other similar cases they had been useless.

The following is my personal experience with similar modes of treatment in dispensary cases: I have collected and tabulated from my history-books three hundred cases of which I had sufficient data to enable me to draw conclusions from them. They are scattered through three summers, and include all the cases in which the result of treatment was recorded. They were treated, with but few exceptions, by one of the following methods: (1) A compound prescription, consisting of chalk-mixture, paregoric, and some vegetable astringent; (2) the same, preceded by castor-oil; (3) an emulsion of castor-oil and paregoric, containing from three to eight minims of each, according to age; (4) bismuth and Dover's powder, frequently but not always preceded by castor-oil.

TABLE I.

Three hundred cases treated by opium, bismuth, astringents, and castor-oil.

Duration of Treatment.	Cured.	Improved.	Unimproved.	Died.
2 days or less.....	102	40	44	13
3 to 4 days.....	68	27	23	16
5 to 6 days.....	44	20	17	4
7 to 9 days.....	46	17	12	13
10 days and over.....	40	12	11	9
Total.....	300	116	107	55
				22

Inasmuch as twenty-five of the cases treated two days, and ten of those treated from three to four days, were put down as "greatly improved," the probabilities are strong

that if they had been followed up a little longer they could have been transferred to the column "cured." This would raise the "cures" to 151, or 50 per cent., and reduce the improved to 82, or 27 per cent.; unimproved, 18·3 per cent.; died, 7·3 per cent.

TABLE II.

Showing previous duration of disease, and results in two hundred and eighty-four of the same cases.

Previous Duration.	Cured.	Improved.	Unimproved.	Died.
2 days or less.....	79	34	24	17
3 to 4 days.....	80	36	29	7
5 to 6 days.....	16	9	4	2
1 to 2 weeks.....	83	27	36	15
2 to 3 weeks.....	5	2	1	1
4 weeks and over.....	21	2	12	6
Total.....	284	110	106	48
				20

Under four days' duration, 55 per cent.; over one week's duration, 38 per cent.

TABLE III.

Showing variety and severity of the same cases.

Diarrhoea, severe.....	93
Diarrhoea, moderate.....	175
Colitis and entero-colitis.....	28
Cholera infantum.....	2
Total.....	298

In 129 cases vomiting was also present.

The results given in the foregoing tables are certainly nothing to be proud of. And yet I venture to affirm that they are quite as good as other men under similar circumstances have obtained with the same methods of treatment, as they would find out for themselves if they took the trouble to record and then analyze their results critically. My own "impressions" regarding the value of many drugs, after

using them, I have so often found erroneous when an appeal to cold facts was had that I have become very loath to accept the "impressions" merely of others.

Still it must be remembered that many of the above-mentioned were bad cases, and all were seen under the worst surroundings. So I hope no one will for a moment think of comparing them with results obtained among the better classes in private practice.

The dietetic regulations above laid down were carried out so far as practicable, with the single exception that in the earlier cases abstinence from milk was not so strongly and so universally insisted upon. Recourse was had to cold sponging and the cold bath where the temperature was high, to alcoholic stimulants in almost all protracted cases, and to day-excursions upon the water on the Floating Hospital.

Could anything more be done for these unfortunate children than I was doing? was a question I often revolved in my mind, as many of them came back day after day and week after week, while I shifted about from bismuth and Dover's powder to calomel and chalk, and from calomel and chalk to castor-oil and opium, etc., often with improvement, but too often, alas! but temporary, until patience was exhausted, and they sought advice elsewhere, much to my relief, and I hope to theirs also.

It was a year ago last summer that the monograph of Baginsky, already mentioned, came into my hands. To him I give the credit of starting me in what I believe to be the correct and rational method of treatment. He had used evacuants and antiseptics largely, and commended them. He regarded resorcin as the most valuable antiseptic in intestinal diseases, and, though my own experience has led me to differ with him here, I think his views in the main correct.

Quite an extensive experience with the salicylate of sodium in various dyspeptic disorders of adults led me, without knowing to what extent it had been already used, to try it here.

The following table gives the results obtained with this treatment. The cases were not selected; it was used indiscriminately in all varieties and all stages. In about two thirds of the cases it was preceded by castor-oil. In one or two cases with great nervous irritability a grain of Dover's powder was given once or twice a day for this symptom merely. With these exceptions, no other drugs were used:

TABLE IV.

Showing duration of treatment and results in eighty-one cases treated by salicylate of sodium.

Duration of Treatment.	Cured.	Improved.	Unimproved.	Died.
2 days or less.....	29	20	6	3
3 to 4 days.....	31	22	6	2
5 to 6 days.....	12	11	0	1
7 to 9 days.....	7	6	1	..
Over 10 days.....	2	1	1	..
Total.....	81	60	14	6
				1

This would give the following results in percentages: Cured, 66 per cent.; improved, 19·7 per cent.; unimproved, 7·4 per cent.; died, 1·2 per cent.

This does not quite state the facts in the case. It will be noticed that all of the twenty-one cases except three, in which treatment was followed up for over four days, were cured. Further, in the "improved" column, eight of the twelve patients, taking the drug for four days or less, were marked "greatly improved," and it is highly probable in all of these cases that, had treatment been continued a little longer, a cure would have resulted. Making these

changes as we have done in Table I, we shall have : Cured, 84 per cent. ; improved, 7·4 per cent. ; unimproved, 7·4 per cent. ; died, 1·2 per cent. This certainly does not overstate the results obtained in the foregoing cases.

TABLE V.

Showing previous duration of disease, and results of eighty-one cases treated by salicylate of sodium.

Duration.	Cured.	Improved.	Unimproved.	Died.
2 days and less.....	22	19	2	1
3 to 4 days.....	18	14	1	3
5 to 6 days.....	8	6	2	..
1 to 2 weeks.....	20	12	7	1
2 to 3 weeks.....	3	3
4 weeks and over.....	10	6	2	1
Total.....	81	60	14	6
				1

Under four days, 49 per cent. Over one week, 40 per cent.

Some of the most striking results seen from the drug were obtained in the cases of long standing. Thus, all three of the cases of three weeks' duration were cured, the average duration of treatment being 3·6 days.

Of the ten cases which had lasted four weeks and over, six were cured, the average length of treatment being 5·6 days. One of the "improved" patients took the medicine for about four days with great benefit, and was well in ten days or two weeks without further treatment. The other had had entero-colitis all summer, did not take the medicine over three days, and was greatly improved, but it was then discontinued, and I learned a week later that the case had relapsed.

The six "unimproved" cases are interesting and deserve something more than mere enumeration, as they illustrate quite well some of the difficulties in treating these cases.

Three of the patients were brought to the dispensary but once. All of these were recent cases, and only one was severe. Prompt relief not being evident, physicians were summoned to the house in two cases, and the third patient was taken to another dispensary three days later. I have no means of knowing how much or how little of the medicine was given.

A fourth patient with severe diarrhoea, of eight days' standing, the passages being watery in character, took the salicylate for two days without benefit; the drug was continued, but the case was never heard from again.

A fifth patient had had a severe entero-colitis for two or three months. Salicylate of sodium was given for five days, and then opium and astringents were used for four days, but without benefit in either case, and the patient was not traced farther.

The sixth patient took the drug ostensibly for four days without improvement. Subsequent events proved the mother's statements concerning the case to be utterly untrustworthy, and it is extremely doubtful if any directions were carried out as given.

The single fatal case was as follows: It was that of a wasted, wretched child in its fourth severe attack during the summer. The salicylate was given for four days with the effect of controlling the diarrhoea; vomiting, however, continued, and the child wasted steadily and died about two weeks later.

TABLE VI.

Showing type and severity of salicylate-of-sodium cases.

Colitis or entero-colitis	23
Diarrhoea, severe.....	18
Diarrhoea, moderate.....	39
Genuine cholera infantum	1
Total.....	81

In twenty-nine cases vomiting was also present when the patients came under treatment; in many more it was a prominent symptom at the beginning of the attack.

TABLE VII.

Showing duration of treatment and results of forty-four naphthalin cases.

Duration of Treatment.	Cured.	Improved.	Unimproved.	Died.
2 days and less.....	15	7	3	4
3 to 4 days.....	12	11	..	1
5 to 6 days.....	10	6	3	..
7 to 9 days.....	6	5	1	..
Over 10 days.....	1	1
Total.....	44	30	7	6
				1

Cured, 67 per cent.; improved, 15·8 per cent.; unimproved, 13·5 per cent.; died, 2·2 per cent.

The "improved" cases were as follows: One patient was greatly benefited at the end of five days, but the mother stopped attending, and I heard a week later that the case had relapsed. In the second, a chronic case, the patient was greatly improved after two days; took no more medicine; ultimate recovery in two weeks. A third, also chronic, was doing nicely after two days' treatment, when measles developed which proved fatal. A fourth the notes simply state to have been "improved" after one week's treatment. A fifth, with severe gastro-intestinal catarrh, had diarrhoea controlled after two days' treatment, but vomiting continued; the patient could not be found when looked for afterward to learn the final result. A sixth, also not found, with severe chronic colitis, was greatly improved when last seen, after being under treatment for five days. The remaining patient would not take the medicine in the doses directed. It was stopped after three days, only slight improvement having occurred. Thus it appears that in no

case, except possibly the fourth, was there a real test as to the value of the treatment.

In one of the six "unimproved" cases, a recent one, the patient took the drug for four days without any benefit, ultimately recovering at the end of two weeks without further treatment.

A second patient, a boy nine years old, who had had dysenteric stools for a week, after two days' treatment was worse; opium, bismuth, and salicylate of sodium subsequently failed also, and he was then lost sight of.

A third patient, with a moderate diarrhoea of two weeks' standing, was no better after taking naphthalin, but was promptly relieved by the salicylate of sodium.

In a fourth case, one of chronic diarrhoea of four weeks' standing, the patient took the medicine for two days only; I learned subsequently that he had not been relieved, and that the disease lasted a month longer.

A fifth case was similar, except that the patient recovered in two weeks instead of four.

The remaining case, a severe diarrhoea of a month's duration, was not improved after five days' treatment. I learned that no further treatment was employed, and the child died two weeks later.

The only fatal case occurring while under treatment was a severe one, where vomiting was very persistent; there was no relief, and death took place two days after the patient was first seen.

TABLE VIII.

Showing previous duration of disease, and results in naphthalin cases.

Duration.	Cured.	Improved.	Unimproved.	Died.
2 days and less.....	17	16	..	1
3 to 4 days.....	8	4	3	1
5 to 6 days.....	3	2
1 to 2 weeks.....	9	6	1	2
2 to 3 weeks.....	2	1	1	..
4 weeks and over.....	5	1	2	..
Total	44	30	7	6
				1

Less than four days' duration, 56 per cent.; over one week, 36 per cent.

TABLE IX.

Showing variety and severity of naphthalin cases.

Colitis and enterocolitis.....	13
Diarrhoea, severe.....	9
Diarrhoea, moderate:.....	19
Total.....	41

Vomiting was present in ten cases; in several severe.

TABLE X.

Showing results in twenty-seven cases treated by resorcin.

Duration of Treatment.	Cured.	Improved.	Unimproved.	Died.
2 days or under.....	9	6	1	2
3 to 4 days.....	11	6	2	3
5 to 6 days.....	1	1
7 to 9 days.....	4	1	2	1
Over 10 days.....	2	1	1	..
Total.....	27	15	6	6

Cured, 55 per cent.; improved, 22 per cent.; unimproved, 22 per cent.

TABLE XI.

Showing previous duration of twenty-five resorcin cases.

Duration of Disease.	Cured.	Improved.	Unimproved.	Died.
2 days or less.....	10	5	2	3
3 to 4 days.....	5	3	1	1
1 to 2 weeks.....	8	5	2	1
4 weeks and over.....	2	..	2	..
Total.....	25	13	7	5

Four days' duration or less, 60 per cent.; over one week, 40 per cent.

TABLE XII.

Showing variety and severity of resorcin cases.

Colitis or entero-colitis.....	4
Diarrhoea, severe.....	7
Diarrhoea, moderate.....	14
Total.....	25

Vomiting was present in ten cases of diarrhoea when coming under treatment.

The cases treated by resorcin, as regards variety, severity, and previous duration, it will be seen, correspond very closely with those treated by naphthalin and salicylate of sodium. Experimentation with the three drugs was carried on at the same time. Yet it soon became evident, as the tables show, that it was not nearly so effectual as either the salicylate or naphthalin. Castor-oil was used as a preliminary step in about the same proportion of cases as with the two latter drugs.

The use of the same drug at the Infant Asylum among a different class of patients led to about the same conclusion, although I have not the figures at hand of the number of cases in which it was given.

This experience with resorcin strengthens me much in the opinion that in the naphthalin and salicylate cases it

was not to the initial dose of oil and the subsequent attention to feeding alone that the results obtained in these cases were due, since exactly the same measures were used in the resorcin cases, and yet 22 per cent. of the patients were unimproved.

TABLE XIII.

Showing length of treatment and results in twenty-eight bichloride-of-mercury cases.

Duration of Treatment.	Cured.	Improved.	Unimproved.	Died.
2 days and less.....	10	2	4	3
3 to 4 days.....	14	3	8	3
5 to 6 days.....	4	1	2	1
Total.....	28	6	14	7
				1

Cured, 21·4 per cent.; improved, 50 per cent.; unimproved, 25 per cent.; died, 3·6 per cent.

TABLE XIV.

Showing duration before treatment of bichloride cases.

Duration before Treatment.	Cured.	Improved.	Unimproved.	Died.
2 days and less.....	5	2	2	1
3 to 4 days.....	7	2	4	1
5 to 6 days.....	2	..	1	..
1 to 2 weeks.....	11	1	6	4
3 weeks and over.....	3	1	1	1
Total.....	28	6	14	7
				1

Four days or less, 42 per cent.; over one week, 50 per cent.

TABLE XV.

Showing variety and severity of bichloride cases.

Colitis and entero-colitis.....	22
Diarrhoea, moderate.....	4
Diarrhoea, severe.....	2
Total.....	28

These bichloride cases are the only ones in all my tables given which were selected. In point of time they belong not to my later experience while studying the use of antiseptics, but to an earlier time, being contemporaneous with the castor-oil, opium, and astringent cases. Hence many of them were among the worst ones that were treated during that period, and they would have made the results given from that period appear still worse than they do had they not been separately considered. The drug was used not as an antiseptic, but more with the idea of its specific action, in cases of colitis and entero-colitis, as recommended by Ringer and others. It was rarely preceded by a purgative to clear out the bowel, or perhaps the cases would have made a better showing.

The cases are introduced for what they are worth, and, although very strikingly beneficial results were seen in some very obstinate cases, still, on the whole, naphthalin and the salicylate of sodium have been in my hands much more successful in exactly similar cases, as a study of the foregoing tables will make evident.

TABLE XVI.
Showing comparative results from different methods of treatment.

	Number.	Cured.	Improved.	Unimproved.	Died.
Opium, bismuth, castor-oil, etc.....	300	50 %	27 %	18.3 %	7.3 %
Salicylate of sodium....	81	84 %	7.4 %	7.4 %	1.2 %
Naphthalin.....	44	67 %	15.8 %	13.5 %	2.2 %
Resorcin	27	55 %	22 %	22 %

It is unnecessary to compare the cases treated in other particulars. The previous duration of the disease in the different classes does not show any marked variation; they average about the same, except that those treated by the salicylate of sodium were of a little longer standing than those

treated by opium, astringents, etc. A comparison of the duration of treatment in the cured cases shows the great superiority of the salicylate and naphthalin, particularly in cases of long standing.

It is evident from this table that theoretical considerations of the value of antiseptics in this disease are fully substantiated by the facts. I have included in these tables none but dispensary cases, since I wished to get at the comparative results in the same class of patients.

It was not my intention to introduce reports of special cases, but the following one illustrates so many points that I will give it, although the result was no more striking than was seen in dozens of others. As one man was convinced by it, others may be:

A boy seventeen months old was seen on the fifth day of his illness, with the physician who had treated the case from the beginning. The stools were first thin and yellow, afterward green, with some mucus and curds. Bismuth in four-grain doses every two hours had been used from the beginning, and on the third day $\frac{3}{4}$ ij of deodorized tincture of opium had been added. Although the number of stools had been reduced from ten to five a day, there had been no change in their character, and the child's condition was growing steadily worse.

When I saw him he was really in a critical condition; his temperature had risen to 103° F.; he had begun to vomit quite often, his pulse was rapid and weak, he had had five stools that morning, and was losing ground rapidly. He was dull and heavy, mostly from the opium. I suggested a dose of castor-oil to be followed by the salicylate of sodium, gr. ij, every two hours. But my friend said: "He is so weak that it seems to me it would be dangerous to do anything to give him any more stools." He consented to give the treatment a trial in view of the hopelessness of the case under the present methods.

I saw him two days later. He greeted me with the remark, "Doctor, I am a complete convert." During the afternoon and night after I saw the case the boy had seven passages. In the

next twenty-four hours he had two or nearly normal character, and a slight catarrhal diarrhoea lasted four or five days more, by which time he was well. I never saw a patient gain more rapidly.

The objections raised against the oil in the case related are no doubt felt by many, so prevalent is the idea that the great object of treatment is to arrest the discharges. The opium and bismuth here *had* reduced the number of stools from ten to five a day, and yet the child was getting worse all the time. What was the explanation here of the rise of temperature to 103° , the supervention of vomiting, the great prostration, and the rapid and weak pulse? To my mind these were toxic symptoms dependent on the retention in the bowel of the products of the decomposition of food and altered secretions.

Is not the rational treatment, then, to clear out the intestine as promptly and thoroughly as possible, and then address our energies toward stopping further decomposition? In other words, to treat the cause and not the result?

How should the antiseptics be administered?

The salicylate of sodium I have been accustomed to prescribe in doses of from one to three grains every two hours, according to the age, from three months to three years. In these doses the aqueous solution is tasteless, and can be readily given in the food or drink. I have never seen it produce vomiting, but often have seen severe and persistent vomiting controlled by it.

Naphthalin, although possessing a strong odor, is not disagreeable to the taste. On account of its insolubility, it is best given to children rubbed up with some inert powder, like sugar of milk. It should be used in a little larger doses than the salicylate—*i. e.*, gr. $\frac{1}{2}$ to gr. v in young children, according to the age.

Resorcin must be used in smaller doses, gr. $\frac{1}{2}$ to gr. ij,

at corresponding ages. It is bitter, and not so easily given, though freely soluble in water. The bichloride was used in doses of gr. $\frac{1}{120}$ to $\frac{1}{100}$, but, even in these doses, I have more than once seen it produce vomiting.

In all cases I have insisted upon the antiseptic being given at short intervals, as many small doses are much more likely to succeed than a few large ones.

From the foregoing discussion the following conclusions are drawn:

1. Summer diarrhoea is not to be regarded as a disease depending upon a single morbid agent.
2. The remote causes are many, and include heat, mode of feeding, surroundings, dentition, and many other factors.
3. The immediate cause is the putrefactive changes which take place in the stomach and bowels in food not digested, which changes are often begun outside the body.
4. These products may act as systemic poisons, or the particles may cause local irritation and inflammation of the intestine.
5. The diarrhoeal discharges, *at the outset* at least, are to be looked upon as salutary.
6. The routine use of opium and astringents in these cases is not only useless, but, in the beginning particularly, they may do positive harm, since, by checking peristalsis, opium stops elimination and increases decomposition.
7. I do not deny nor undervalue opium in many other forms of diarrhoea than the one under discussion.
8. Evacuants are to be considered an essential part of the antiseptic treatment.
9. Experience thus far leads me to regard naphthalin and the salts of salicylic acid as the most valuable antisep-tics for the intestinal tract.



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